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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/069,680	07/17/2002	Christine Engel	10191/2217	3823

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EXAMINER

JAGAN, MIRELLYS

ART UNIT

PAPER NUMBER

2859

DATE MAILED: 07/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/069,680

Applicant(s)

ENGEL ET AL.

Examiner

Mirellys Jagan

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/17/02.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 July 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☒ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application (10030354.4) filed in Germany on 6/21/00. It is noted, however, that applicant has not filed a certified copy of the application as required by 35 U.S.C. 119(b).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 14-18, 20, 21, 26, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by German Patent 900774 to Siemens.

a. Referring to claims 14-18, 20, 21, and 26, Siemens discloses a thermocouple comprising a first (10) and a second (11) element, wherein:

- i. the first element and the second element are in contact with each other in an area (8) of at least one contact point,
- ii. at least in one vicinity of the contact point the first element includes a first ceramic material and the second element includes a second ceramic material that may be the same or different from the first ceramic material, wherein the material of the first element and the second element have an at least approximately equal

thermal expansion coefficient at least in the vicinity of the contact point when the first and the second materials are the same,

iii. a material of the first element and the second element are configured so that at the contact point one of a contact voltage occurs in accordance with a Seebeck effect and a temperature change occurs in response to an impressed external electric current in accordance with a Peltier effect,

iv. the first and the second elements are electrically interconnected with one of a device configured to measure the contact voltage and a device configured to impress an external electric current flowing through the contact point, and

v. at least one of the first and the second ceramic material includes at least one temperature-resistance electrically semiconductive filler material (see figure 3, page 2, lines 81-90, page 3, lines 21-28, and page 4, lines 1-37).

b. Referring to claim 29, Siemens discloses a method comprising the steps of:

i. providing a thermoelectric component that includes a first element and a second element, wherein the elements are arranged in contact with each other in an area of at least one contact point, and at least one of the first and the second elements includes a ceramic material, and

ii. arranging the component in a thermocouple configured to measure temperature.

4. Claims 14-21, 23, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 2,981,775 to Bachman.

- a. Referring to claims 14-21 and 23, Bachman discloses a thermocouple comprising a first (31) and a second (32) element, wherein:
 - i. the first element and the second element are in contact with each other in an area of at least one contact point,
 - ii. at least in one vicinity of the contact point the first element includes a first ceramic material and the second element includes a second ceramic material that is different from the first ceramic material and a solderable metal (wire),
 - iii. a material of the first element and the second element are configured so that at the contact point a contact voltage occurs in accordance with a Seebeck effect,
 - iv. the first and the second elements are electrically interconnected with a device configured to measure the contact voltage, and
 - v. at least one of the first and the second ceramic materials includes at least one high-temperature resistance filler material (Al_2O_3) (see figures 2 and 3, and column 3, lines 20-69).
- b. Referring to claim 29, Bachman discloses a method comprising the steps of:
 - i. providing a thermoelectric component that includes a first element and a second element, wherein the elements are arranged in contact with each other in an area of at least one contact point, and at least one of the first and the second elements includes a ceramic material, and
 - ii. arranging the component in a thermocouple configured to measure temperature.

5. Claims 14-18, 20, 21, 23, 25, 26, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 4,032,371 to Andersen.

- a. Referring to claims 14-18, 20, 21, 23, 25, and 26, Andersen discloses a thermocouple comprising a first (zone 13) and a second (zone 15) element, wherein:
 - i. the first element and the second element are in contact with each other in an area (11) of at least one contact point,
 - ii. at least in one vicinity of the contact point the first element includes a first ceramic material and the second element includes a second ceramic material that is different from the first ceramic material,
 - iii. a material of the first element and the second element are configured so that at the contact point a contact voltage occurs in accordance with a Seebeck effect,
 - iv. the first and the second elements are electrically interconnected with a device configured to measure the contact voltage,
 - v. at least one of the first and the second ceramic materials includes at least one high-temperature resistance filler material, e.g. Al_2O_3 ,
 - vi. the first and second ceramic materials include a ceramic material based on a SiC compound, and
 - vii. a material of the first element and a material of the second element have an at least approximately equal thermal expansion coefficient at least in the vicinity of the contact point.

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- b. Referring to claim 29, Andersen discloses a method comprising the steps of:
 - i. providing a thermoelectric component that includes a first element and a second element, wherein the elements are arranged in contact with each other in an area of at least one contact point, and at least one of the first and the second elements includes a ceramic material, and
 - ii. arranging the component in a thermocouple configured to measure temperature.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 22-25, 27, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Siemens, as applied to claims 14-18, 20, 21, 26, and 29 above, and further in view of U.S. Patent 4,336,215 to Yajima et al [hereinafter Yajima].

Siemens discloses a thermocouple having all of the limitations of claims 22-24, 27, and 28, as stated above in paragraph 3, except for:

- a. the filler material being one of MoSi₂, CrSi₂, Cr₃C₂, TiC, WC, TiN, FeCr, FeCrNi, ZrN, ZrC, Al₂O₃, SiC, B₄C, BN, ZrO₂, SiO₂, Si₃N₄, and graphite;

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- b. at least one of the first and the second ceramic materials being obtained by pyrolysis of one of a polymeric precursor material and a polymeric precursor material that includes at least one filler material;
- c. at least one of the first and the second ceramic materials including one of SiC, SiCN, SiTiCO, SiCO, SiBCN, SiBCO, BCN, SiAlCO, SiAlNCO, and SiCON compounds; or
- d. the first ceramic material being obtained by pyrolysis of one of a first polymeric precursor material and a first polymeric precursor material that includes at least one first filler material, and the second ceramic material being obtained by pyrolysis of one of a second polymeric precursor material and a second polymeric precursor material that includes at least one second filler material, wherein the first and second precursor materials undergo approximately equal shrinkage in the vicinity of the contact point in response to pyrolysis.

Yajima discloses a ceramic component having a ceramic composite material containing a filler material. The ceramic material is obtained by pyrolysis of a polymeric precursor material such as SiC that includes at least one filler material such as MoSi₂, CrSi₂, TiC, WC, Al₂O₃, SiC, B₄C, BN, ZrO₂, SiO₂, and Si₃N₄. Yajima teaches that a ceramic material such as SiC is obtained by pyrolysis of a polymeric precursor material that may include at least one filler material, wherein the ceramic material is a powdered form that may be molded into any desired shape (see column 6, lines 32-56,

Referring to claims 22-25, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the thermocouple disclosed by Siemens by

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replacing the ceramic material used to make the thermocouple with a ceramic material as disclosed by Yajima, since these materials are alternate and equivalent ceramic materials having temperature and corrosion-resistant properties that are useful for making the thermocouple.

Referring to claim 27, Siemens discloses that the first and the second ceramic materials may be different from each other. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the thermocouple disclosed by Siemens by replacing the ceramic materials used to make the thermocouple with ceramic materials as disclosed by Yajima, since these materials are alternate and equivalent ceramic materials having temperature and corrosion-resistant properties that are useful for making the thermocouple.

Referring to claim 28, Siemens and Yajima disclose that the ceramic materials have very low thermal expansion characteristics. . Therefore, approximately equal shrinkage will occur in response to pyrolysis.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following publication and patents disclose a ceramic composite material:

U.S. Patent Application Publication 2003/0092557 to Aichele et al

U.S. Patent 4,326,039 to Kriegesmann et al

U.S. Patent 5,223,195 to Kuwabara

U.S. Patent 5,332,701 to Bryson et al

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U.S. Patent 5,232,286 to Dubreuil et al

U.S. Patent 4,105,455 to Koga et al

U.S. Patent 4,298,558 to Baney et al

The following patents disclose a thermoelectric apparatus:

U.S. Patent 6,271,460 to Yamashita et al

U.S. Patent 3,906,721 to Micheli et al

U.S. Patent 2,094,102 to Fitterer

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 703-305-0930. The examiner can normally be reached on Monday-Thursday from 8AM to 4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 703-308-3875. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7725 for regular communications and 703-308-7725 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

mj
July 17, 2003



Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800